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ABSTRACT

The environmental context of the Trace Center is first briefly described as background for a more detailed description of the center's service delivery activities in the field of rehabilitation/education technology. Trace serves four major functions in rehabilitation/education technology. As a nationally funded rehabilitation engineering center, Trace conducts research in control, communication, and access to information technologies. The second major thrust is the development of new products, concepts, and information. Thirdly, Trace disseminates information via resource books, a reprint service, and a workshop series. Finally there is the support of four service delivery programs: the Communication Aids and Systems Clinic (emphasizing individualized access to communication systems, primarily on an outpatient basis); the Communication Development Program (which serves non-school age clients with developmental disabilities primarily by coordinating existing therapy and support systems within each client's environment); Rehabilitation Research Services (which focus on equipment adaptation, construction, and one-time project development); and limited-term projects, usually involving outside funding. Program evaluation of any service delivery project should consider field coordination, program components, vertical integration, and competency of professionals, as detailed in a checklist. (PB)

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SERVICE DELIVERY AND RELATED ISSUES AT THE TRACE RESEARCH AND DEVELOPMENT CENTER

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SERVICE DELIVERY AND RELATED ISSUES AT THE TRACE RESEARCH AND DEVELOPMENT CENTER

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THE TECHNOLOGY ENVIRONMENTAL CONTEXT

To fully understand the service delivery operation of the Trace Research and Development Center, it is necessary to briefly describe the overall environmental context in which the Trace Center fits. It turns out that, in the field of rehabilitation/education technology, there are eight major categories that describe program activities. Four of these are service delivery activities. The other four are not specifically service delivery functions, but are vital to effective service delivery programs.

Evaluation and selection of equipment is one of the key service delivery activities. This is a typical procedure for obtaining equipment in all of our daily lives. If we fail, however, to ascertain our needs correctly and consequently purchase the wrong piece of equipment, it may simply be an inconvenience. If, on the other hand, a child with a disability is given the wrong typewriter, or is set up with an inappropriate communication board, it can result in the profound under-utilization of the child's talents, or extreme overtaxing of the child's abilities. If the equipment is not flexible enough to meet demands, the individual will only be working up to 20% of potential. If, on the other hand, the particular device is designed to function well above the individual's capabilities, the system only aggravates a frustrating experience. We see these situations in our affiliated clinics too often, and the result is usually that the device or system ends up in somebody's closet.

Once a particular device or system has been matched to an individual and his/her particular disabilities, availability of equipment becomes a major service delivery activity. This is where we rely on the distribution activities of any service delivery system. Historically, many rehabilitation and educational technological devices have been invented, developed, and researched in the laboratory, then only presented in some esoteric technology conference. Thus, they are never marketed and never become available to those who need them. Distribution systems are vital to adequate service delivery.

Assuming that the particular device or system is adequately distributed, implementation or using the device or system is the next critical service delivery activity. Successful implementation of any technology relies on adequate training. Any device is totally worthless without the user being able to apply it within functional situations. Thus, the ultimate training needs to be provided directly to the user of the device or system. In most rehabilitation and educational settings, however, this also requires training of the service delivery professionals, to be trainers. A service delivery system without this dual training activity will likely be ineffective.

Assuming that the service delivery program evaluates individuals well, selects the appropriate pieces of equipment, assures that the equipment is distributed, and provides a system for training

the professionals and users, one major activity is still required to prevent a service delivery system from degenerating into a useless program.

This last activity is the reevaluation, monitoring, and revision of any system or device. At the Trace R&D Center, we know of no communication aids or systems that are self-perpetuating. Every one of the pieces of equipment or communication systems that we have recommended or placed has required ongoing reevaluation because the child is growing or the adult is improving in skills. Furthermore, periodic reevaluation is not adequate. Ongoing monitoring of the system is necessary because reevaluations frequently take place in less than optimal environmental situations, such as a child in a testing environment and not the natural communication setting.

When the four service delivery activities, described above, are all integrated, they can result in an effective program. In the "macro" service delivery picture, however, their real success is dependent on four other affiliated service delivery activities. First, any technological equipment is dependent on whether that equipment has been manufactured. Either a one-time fabricator is necessary, or a mass market manufacturer must be involved in providing the equipment. Likewise, manufacturing is dependent on a more fundamental activity: research and development. This is the second affiliated service delivery activity. Prior to the manufacture of any system, that system must be developed and tested. Third, service delivery is also dependent on activities which include education, information, resources, and referral. All devices and systems rely on professionals, parents and individual users being aware of their availability, and on resource professionals who can help them select the specifications of the equipment and learn the skills for using the equipment to tackle their particular needs. The last affiliated service delivery activity is the foundation. Service delivery is dependent on basic research. The theoretical and knowledge base of the field provides the substantiation of the methodologies we use within service delivery.

It can be seen that, in the short term, however, service delivery programs must realize their dependence on manufacturers, distributors, developers, researchers and educators. Understanding this context of the technology environment describes the rationale for the Trace Center programs.

SERVICE DELIVERY ISSUES

Four primary service delivery issues can be categorized:

Issue 1: Field Coordination Needs

The first issue relates to the previously described four service delivery activities, and the four related functions. The issue emerges from the critical reliance service delivery has on the four related activities. Any successful service delivery program must interact and coordinate with the other functions to be an effective long-term program.

A key coordination issue that program administrators frequently forget is the imperative nature of continuing education. In the area of rehabilitation/education technology application, the field is changing rapidly, and without ongoing education, a service delivery program will very quickly be using outdated approaches, devices and systems.

Second, the administrative commitment to providing feedback to the research and development centers is critical. The R&D centers are dependent on those who are applying the technology for ongoing suggestions regarding the overall directions of research and development, specific modifications, adaptations, and other R&D needs.

A third area of coordination needed is for administrators of service delivery programs to be providing information to distributors and manufacturers regarding their ongoing and future needs for systems and devices. Distributors and equipment manufacturers are constantly attempting to remain current on the needs within the field, and predicting what the future needs will be. Providing information to these groups of distributors and manufacturers is not only welcome, but necessary.

The fourth area of coordination is in providing feedback to resource centers, schools of higher education, and continuing education programs. These groups of information providers are always forecasting what the most important areas of continuing education needs will be for the professionals in the area of rehabilitation/educational technology. One of the best methods of learning about current educational needs is when the professionals applying the technology specifically request that further education opportunities be available to them on particular topics.

Issue 2: Program Components
(Seven Necessary Components for Matching the System to the Individual)

Matching the device or system to an individual's particular needs to support education goals is a complex process, and one to which much discussion is being oriented within other areas of this conference. A brief listing of the seven procedures is worth mentioning in this context, however. Frequently, however, inadequacies of service delivery programs can be directly attributed to the program's lack of attention to one of these seven procedures.

1. Understanding the potential of technological and nontechnological systems is absolutely critical, before any application can even be considered.
2. The individual must be evaluated to ascertain his/her abilities and functional areas of deficit. This evaluation must look at specific functional activities, look at particular skills and abilities, and also explore the particular reasons that an individual has deficits in certain activity areas.
3. An evaluation must be performed on available systems and technologies. Even though we may have identified the exact problems of an individual, if we are not knowledgeable about available systems and the technological possibilities, we will not be able to make the appropriate match.
4. Once we have fully evaluated the individual and the available systems and technology, a decision must be made to select the appropriate system.
5. Acquiring the system becomes the next step. This is the step that we are already very familiar with, that seems as if it would be simple because the needs are clear. However, actually convincing any funding agency or administrator of the bureaucracy becomes a major skill in itself.
6. Once a system has arrived, the individual who will be using the system must be trained in the appropriate techniques for properly applying the system in his/her own environment.
7. Follow-up and revision of the program on an ongoing basis is imperative.

These seven procedures can be viewed as part of a program checklist. A successful program will perform all seven components effectively.

Issue 3: Vertical Integration of Services

Perhaps one of the most difficult service delivery activities is in the domain of integrating services. Rehabilitation and education technologies have caused the emergence of many specialized professionals. These individuals have, to date, been serving as regional experts. This has restricted the availability of technological services substantially; perhaps the most limiting aspect of this phenomenon has been that individuals usually work for one agency or organization. Thus, when students or clients move into a system that has a technology expert, they have access to these benefits, but when they move out of the system, they quickly lose the benefits of the technology expert.

In medical care, there is a concept called "vertical integration." Acute care hospitals are now vertically integrating their services by expanding their activities to include home health care companies, nursing homes, outpatient rehabilitation services, and even family physician services. The result of these vertically integrated systems is that an individual once moving into the system can receive the full range of benefits and move easily between the various levels of services without falling through the cracks between agencies, bureaucracies, or service programs inherently limited in scope.

The implications of the vertical integration of acute care medical services on rehabilitation and educational technologies is that our systems may need to be thinking more vertically in orientation.

The integration of services will need to occur on two levels. One is across geographical regions, and the second is across the longevity of individuals as they grow and mature. If we look at most existing technology services, we see how they tend to split up into little pieces. In terms of geography, due to the current limited expertise in the field, regional evaluation centers have been virtually the only way many areas can access technology applications experts.

In regard to age groups and maturation levels, the educational system has been providing the best continuity, particularly with the new emphasis across the country on providing appropriate educational opportunities for pre-school-aged disadvantaged children. In spite of these improvements, however, once individuals reach a certain age, they are moved out of the educational system, too often into nowhere. This "transitional dump" is the example of our need to vertically integrate services across years. There needs to be a method for transferring technologically oriented services from the educational arena into the vocational domain. Some have suggested that the best method for doing this is to encourage the medical system to provide the continuity and take responsibility for technological services. In any case, the vertical integration of services across regions and years is going to demand substantial attention by the educational, vocational, and medical systems within the next few years to improve any of our current service delivery methods in a comprehensive way.

Issue 4: Competency of Professionals

There is a trend to be looking at service delivery professionals and programs that apply technology more carefully. It has been suggested that appropriate application of technology in rehabilitation and education requires a high level of expertise in several ways. First, any service delivery program should be assessed in terms of how well it provides the coordination for the field in the four areas listed previously. Second, a program should be evaluated in terms of how well it provides the procedures necessary for competent application of any technology-oriented service delivery in the seven steps described earlier. Third, competency should be evaluated across functional areas of need. For example, competency across functional areas in the service delivery

context of augmentative communication highlights five functions. Expertise needs to be available in 1) seating and positioning, 2) motor and sensory areas (physical interface to any system), 3) cognitive and language areas, 4) social and environmental communication areas, and 5) acquisition of funds and equipment. These sets of program competency questions can be compiled into a program evaluation checklist. An example of a checklist summarizing the points discussed in this paper is shown in Table 1 on the following page.

These service delivery competency issues emphasize the need for some type of quality assurance. Methods of qualifying service delivery programs are beginning to be discussed within the rehabilitation/educational technology associations and professional groups. Guaranteeing competency through certification, licensure, or accreditation is being identified more frequently as a need within this field. Until this occurs, however, we have few external guidelines to help us in knowing and expressing competency in the field.

THE TRACE CENTER'S FUNCTIONS AND SERVICES

The Trace Center currently serves four major areas of function and services in the area of rehabilitation/education technology. The first is research. As one of the nationally funded Rehabilitation Engineering Centers, the Trace Center has a mandate to perform research in the field of communication, control, and access to information technologies. Consequently, its research thrust has provided vital information to the field with regard to the human use of communication devices and systems, and the effectiveness of using certain techniques and approaches with various disabilities. The research at the Trace Center has led to and has been integrally tied to the following additional functions.

The second major thrust of the Trace Center is in the area of developing new products, concepts, and information. Over the last decade, the Trace Center has developed numerous new devices and ideas that have been adopted by manufacturers of communication systems internationally.

The third primary function of the Trace Center is its information resource and referral services. The Trace Center disseminates information via the production of resource books, through its reprint service and through its workshop series. All of these methods have been providing current information to the field in the area of communication, control, and computer access. Additionally, and perhaps most significantly, the information resource and referral services provide the Trace Center staff with information. They, in turn, maintain their current knowledge of the products, applications, and communication approaches being used throughout the country and the world.

The fourth major function of the Trace Research and Development Center is to support service delivery programs. There are four programs with which the Trace Center is involved. Sara Brandenburg from the Trace Center has provided more in-depth information about two of these service delivery programs, focusing on the evaluation process. Thus, only an overview of the four programs is given here.

The first service delivery affiliated program is the Communication Aids and Systems Clinic (CASC). CASC is administrated through the Clinical Sciences Center at the University of Wisconsin-Madison; the Trace Center shares staff with CASC. The population which the clinic serves is best described as all populations; approximately 50% are school age, and 50% non-school aged. Its overall emphasis of evaluation and treatment is on communication systems and access to the most effective system for the specific individual. The program process used by the CASC is primarily an outpatient evaluation, with some inpatient hospital involvement. The over

TABLE 1

PROGRAM EVALUATION CHECKLIST

A. Field Coordination

1. Does the program provide adequate preservice education for the professionals involved in applying the technically oriented devices and systems?
2. Does the program provide sufficient ongoing continuing education so that all team members within the program may maintain their skills?
3. Does the program have a mechanism for providing feedback to relevant research and development centers?
4. Does the program have a method for providing feedback to manufacturers and distributors of equipment in the area?
5. Does the program have a feedback mechanism to provide information to institutions of higher education and resource centers that can facilitate appropriate continuing education programs?

B. Program Components

1. Do program staff members understand the full potentials and limitations of the technology they are applying?
2. Does the program provide a comprehensive evaluation of the individual student/clients in critical areas of functioning?
   a. seating and positioning,
   b. motor-sensory function (physical interface),
   c. cognitive and language functions, and
   d. social and interactive functions.
3. Does the program provide adequate evaluation of the different technological devices and systems?
4. Does the program match the needs of the individual to the capabilities and features of the technological systems?
5. Does the program secure the needed funds and assist in the acquisition of the equipment or devices required?
6. Does the program provide appropriate training for the users to be able to apply their systems in all of their needed environments?
7. Does the program incorporate appropriate follow-up in terms of monitoring the existing system and revising/updating the system as needed?

C. Vertical Integration

1. Does the program integrate across geographical regions?
2. Does the program integrate across the longevity of the students/clients within the program?

D. Competency of Professionals

1. Do the program team members have appropriate experiential and educational backgrounds?
2. Do the program team members hold appropriate licensure/certification/registration credentials for providing the needed services?

all format of the CASC contains several unique features. One is that an information form and videotape are required prior to a clinic evaluation. Thus, all potential clients or students first receive an initial background and history form to complete. Later, they complete a more detailed information form about their communication, seating and positioning systems. At this time, they submit an actual videotape of the client's/student's performance in the school or home setting. A second component of the evaluation process is that the team, which consists of speech and language pathologists, occupational therapists, and rehabilitation engineers, reviews the history and information form, along with the videotape. During this pre-evaluation conference, an evaluation strategy is proposed which provides the framework for the actual evaluation procedures when the client arrives. The third component of the process is the actual evaluation. As many members of the client's/student's educational/rehabilitation team as possible, if not the entire team, are requested to attend the evaluation. CASC feels that it is critical for the client's educators, clinicians, and family members to be involved with the client during the evaluation process.

The actual procedures during the evaluation begin with an introductory discussion with the student/client and entire support network. These groups range from as few as 2 people, or as many as 8 or 10. During this session, initial goals are identified, and an evaluation strategy finalized. Then, the client's/student's positioning and seating is evaluated, which results in recommendations and possible modifications. The next step in the procedure is the communication evaluation, where the student's/client's interaction skills are assessed, along with language and speech skills, and overall cognitive abilities. The final step of the evaluation procedure is the assessment of the student's/client's physical interface. This usually includes simulation or actual demonstration of various communication aids and systems. This process begins with evaluating the student's/client's current system and proceeds on a trial basis to interface with modifications to the current system or introduction of a new system(s).

Following the evaluation, the fourth major component of the overall CASC program process occurs. This component is the follow-up with funding of any equipment that may need to be purchased, the actual purchase or loan, the introduction of any communication program that has been recommended, and the training of the overall communication system.

The Communication Development Program (CDP) is the second service delivery program affiliated with the Trace Center. The CDP is administrated directly through the Trace Center and funded by Dane County. The population served by this program consists of non-school age clients with developmental disabilities. The program process relies on a diverse set of activities. A large portion of the time is spent coordinating existing therapy and support systems within every client's environment. This requires a significant amount of consultation. Additionally, direct therapy is provided for a substantial number of the clients. In virtually every case, advocacy for the client becomes a primary role for the program staff. The program is staffed by speech and language pathologists who provide the direct services and the coordinating services. The CDP program activities are provided much differently than the evaluation process of the CASC. With the CDP, the services are provided basically on-site within the client's environment. This means that the clinicians within the CDP spend most of their time in client's homes, on work sites, and out in the community.

The third service delivery program affiliated with the Trace Center is the Rehabilitation Research Services (RRS). This program is administrated through the Trace Center, and funded through cost-reimbursement. The services provided by the RRS are basically technological equipment adaptation, construction, and one-time project development. The clients of the RRS are from the Trace Center affiliated clinics.

The fourth service delivery program includes limited-term projects, usually with outside grant funding. An example of this type of project is the DATA project (Disabled Access to Technical Advances). The Trace Center's involvement in this project was subcontracted as part of a larger grant involving the Vocational Rehabilitation Department, Computers to Help People, and Access to Independent Living, Inc. (the Madison region independent living center). This project was aimed specifically at providing technological systems to clients with the primary objective of moving them into successful employment. Research data were collected to demonstrate the effectiveness of technological intervention in securing and maintaining long-term employment for persons with disabilities.

CONFRONTATION OF SERVICE DELIVERY ISSUES

The Trace Center attempts to confront many of the service delivery issues head on. Both the CASC and the CDP attempt to address the four coordination needs. These programs strongly support continuing education to maintain the expertise of all of the treatment staff. These programs also provide direct feedback to the research and development programs and staff of the Trace Center, and to other research and development centers throughout the country. Due to the nature of the research and development at the Trace Center, all of our clinically affiliated staff have easy access to distributors and manufacturers in the field. Consequently, the treatment staff provide ongoing information to distributors and manufacturers regarding the availability, or lack of availability, of systems and devices. With regard to providing information on educational needs back to resource centers and schools of higher education, the service delivery staff at the Trace Center are very involved in their respective national associations and their continuing education programs. Furthermore, many of the Trace Center staff have joint appointments with related professional educational programs at the University of Wisconsin. Perhaps most profoundly, the service delivery staff can directly feed information to the workshop series run by the Trace Center.

Both the CASC and the CDP work very carefully on the seven necessary steps in matching functional systems to individuals' needs. Each one of the programs, however, has its own particular advantages and disadvantages. For example, the CASC provides full evaluations; however, due to its regionally oriented format, the training and follow-up aspects become very difficult. On the other hand, the CDP is primarily a coordinating program, so it is able to do an extremely competent job in training in follow-up, but it does not have the same full access to the concentrated, interdisciplinary team evaluation.

Perhaps one of the major challenges of all of the service delivery programs affiliated with the Trace Center is vertically integrating services across geography and across the developmental years and maturation years of its clients/students. The CDP, however, does do particularly well in addressing the need for integrating services across the years, because it specifically provides services for those excluded from the educational services because they are not of school age.

IMPLICATIONS/RECOMMENDATIONS/SUGGESTIONS FOR SERVICE DELIVERY

There are two major implications revolving around what we have seen at the Trace Center in terms of service delivery. First is that the concept of comprehensive community service delivery centers in rehabilitation/education technology is becoming mandatory. The formulation of these types of delivery centers would, of course, need to be very carefully and directly linked to the specialized regional centers. For example, the ideal scenario might be that specialized regional centers would focus on areas such as wheelchairs, positioning and seating, computer use and access, augmentative communication, or motor and sensory access techniques. These specialized re-

gional centers would then serve as the intense evaluation and resource centers which all of the community centers would tap. To supplement a maintained compilation of the most advanced of human factors and therapeutic techniques and approaches, the specialized regional centers would also house the most complete and most current technological devices and systems.

The second major implication for service delivery is that, regardless of what type of service delivery program is being provided in rehabilitation/education technology, there seem to be significant funding barriers. Consequently, there needs to be an increased awareness of what the potentials are in the applications of these types of technologies. Then funds must become available to provide direct contact services. Even more important is the need for legislators, administrators, and other power brokers managing important technological funds to recognize that service delivery in the area of technology and education rehabilitation involves a substantial amount of time for coordination, management, administration, team meetings, and continuing education. Thus time cannot be funded just for direct student/client contact. Significant time must be available for these other functions. One of the very important needs we have been able to provide through the CDP has been due to its funding base. The county funding has permitted the staff of the CDP to serve as client advocates and coordinators for the clients' overall communication program within their entire work, home, and community environments. We have found that it is only under these reimbursement or funding scenarios that the vertical integration and overall coordination of service delivery can be obtained.

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